federal register

THURSDAY, MARCH 3, 1977

PART III

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

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NOISE STANDARDS AIRCRAFT TYPE AND AIRWORTHINESS CERTIFICATION

Noise Level Limits and Acoustical Change Requirements For Subsonic Transport Category Large Airplanes and For Subsonic Turbojet Powered Airplanes

Title 14—Aeronautics and Space

CHAPTER I—FEDERAL AVIATION ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

[Docket No. 15131; Amdt. 36-7]

PART 36—NOISE STANDARDS: AIRCRAFT TYPE AND AIRWORTHINESS CERTIFICATION

Noise Level Limits and Acoustical Change Requirements for Subsonic Transport Category Large Airplanes and for Subsonic Turbojet Powered Airplanes

The purpose of this amendment to Part 36 of the Federal Aviation Regulations (14 CFR Part 36) is to provide for three stages of aircraft noise levels with specified limits, to prescribe definitions for classifying airplanes under each stage, to require applicants for new type certificates applied for on or after November 5, 1975, to comply with "Stage 3" noise limits which are more restrictive than those in current Appendix C (herein redesignated as "Stage 2"), and to prescribe the acoustical change requirements for airplanes in each noise level stage under Part 36. This amendment applies to subsonic transport category large airplanes and to subsonic turbojet powered airplanes. The primary basis for this amendment is § 611 of the Federal Aviation Act of 1958 (49 U.S.C. 1431), as amended by the Noise Control Act of 1972 (Pub. L. 92-574).

This amendment is based on Notice No. 75-37, published in the FEDERAL REGISTER on November 5, 1975 (40 FR 51476), as supplemented by Notice No. 75-37B (41 FR 5641; February 9, 1976). The period for submitting comments to the regulatory docket regarding the matters contained in Notice Nos. 75-37 and 75-37B closed March 8, 1976. Accordingly, interested persons have been afforded an opportunity to participate in this rule making. All comments submitted have been considered in the issuance of this amendment.

While this amendment is expected to produce significant reductions in the noise created by new aircraft designs, substantial local action will be necessary to complement the noise reduction actions of the Federal Government. The only successful attack that can be launched on the overall problem of aircraft noise is one that involves the cooperative participation of all levels of government, as well as airport operators, manufacturers, and airport neighbors. The responsibilities of these parties are stated in detail in the comprehensive "Aviation Noise Abatement Policy," issued jointly by the Secretary of Transportation and the Administrator on November 18, 1976. That document is available for examination in the FAA Rules Docket.

In addition to The Policy Statement, the FAA has issued a final environmental impact statement (EIS), dated December 7, 1976, concerning this amendment. This document (herein called "The EIS") has been placed in the public rules docket for this amendment. It contains detailed analyses concerning the need for this amendment and its estimated costs and benefits. The EIS also contains a discussions of the alternatives to taking this action and the data used in the environmental and inflationary impact analysis supporting this regulatory action.

I. REGULATORY HISTORY

1. Part 36 of the Federal Aviation Regulations "Noise Standards: Aircraft Type Certification" (34 FR 18355; November 18, 1969), which became effective December 1, 1969, originally prescribed noise measurement, noise evaluation, and noise level requirements for the issuance of type certificates, and changes to those certificates, for subsonic transport categoriy airplanes, and for subsonic turbojet engine-powered airplanes, regardless of category. That regulation initiated the noise abatement regulatory program of the FAA under the statutory authority of Pub. L. 90-411 (July 21, 1968) which added § 611 to the Federal Aviation Act of 1958.

2. On November 5, 1975, the FAA published Notice No. 75-37, a notice of proposed rulemaking (NPRM) entitled "Proposed Noise Reduction Stages and Acoustical Change Requirements for Subsonic Transport Category Large Airplanes and Subsonic Turbojet Powered Airplanes" (40 FR 51476). That NPRM proposed to establish three levels (or stages) of aircraft noise with specified limits and to prescribe definitions for identifying those airplanes classified under each stage. (Those standards include the noise levels created by the airplane during original noise type certification tests.) Notice No. 75-37 also proposed to require applicants for new type certificates applied for on or after November 5, 1975, to comply with noise limits more restrictive than those in current Appendix C; it also proposed to increase the severity of the acoustical change requirements for airplanes that comply with current Appendix C of Part 36.

3. Notice No. 75-37A, a notice of extension of the comment period for Notice No. 75-37, was published on December 24, 1975 (40 FR 59447) in response to a petition for an extension to permit additional time for reviewing the proposal and preparing comments to the docket. The extended period also permitted submission of comments regarding the expansion of the proposed rule in accordance with the following supplemental notice of proposed rulemaking (Notice No. 75-37B).

4. On February 9, 1976, the FAA published a supplemental notice of proposed rulemaking (Notice No. 75-37B; 41 FR 5641), proposing that those provisions in Notice No. 75-37 which would apply to the type certification and acoustical change approval of airplanes with two engines also be applied to single-engine turbojet powered airplanes and single-engine transport category airplanes (regardless of engine type).

5. On July 25, 1975 (40 FR 31255), the Council on Environmental Quality published in the FEDERAL REGISTER a notice of availability for public review and comment regarding a draft environmental impact statement prepared by the FAA regarding the rule proposed in Notice No. 75-37.

6. On October 1, 1976, pursuant to § 611(c)(1) of the Federal Aviation Act of 1958 (the Act), as amended by the Noise Control Act of 1972 (Public Law 92-574), the U.S. Environmental Protection Agency (EPA) submitted to the FAA its recommended regulation to amend FAR Part 36 to supplement and complement the proposals in Notice No. 75-37 by providing additional stages for noise reduction in 1980 and 1985. The EPA proposed to adopt the acoustical change provisions proposed by the FAA in Notice No. 75-37. Revised noise test procedures and conditions, as well as applying Part 36 noise standards to all propeller-driven large airplanes were also recommended by the the EPA proposed rule. That EPA recommended regulation, which is contained in Notice No. 76-22 (41 FR 47352; October 28, 1976; and 41 FR 53807; December 9, 1976), is discussed in greater detail below. The period for submitting written comments to the Rules Docket on the proposal contained in Notice No. 76-22 closes on February 28, 1977.

7. Another supplemental notice of proposed rule making (SNPRM) regarding FAR Part 36 noise levels, Notice No. 75-37C, was also published in the FEDERAL REGISTER on October 28, 1976 (41 FR 47375). That SNPRM proposed certain alternative noise reduction stages and acoustical change requirements to those previously proposed by the FAA. As discussed in that notice, those proposals, including specified changes in the noise measuring points and test procedure, were based on draft modifications to ICAO Annex 16 subsequently adopted by the Interantional Civil Aviation Organization (ICAO) and currently under consideration for ratification by the United States and other member States. Comments regarding the alternative proposals in Notice No. 75-37C may be submitted to the docket until February 28, 1977.

8. Pursuant to Section 611(b)(1) of the Act, the FAA has consulted with the Secretary of Transportation and the EPA prior to adoption of this amendment. Also, submission of this amendment to the EPA for review and comments prior to its adoption is in accordance with § 309 of the Clean Air Act, as amended (42 U.S.C. 1857 h-7), and the guidelines of the Council on Environmental Quality contained in 40 CFR 1500.9(b).

9. As previously indicated, a final environmental impact statement (EIS), reflecting this amendment and the comments received on the draft EIS was issued on December 7, 1976, in conjunction with this regulatory action in accordance with the National Environmental Policy Act of 1969 and implementing guidelines of the Council on Environmental Quality.

II. RELATIONSHIP TO PRIOR RULE MAKING

This amendment is an important part of the FAA's overall aircraft noise control and abatement program. The adoption of FAR Part 36 in 1969 prohibited

the further escalation of aircraft noise levels of subsonic civil turbojet and transport category airplanes and required new airplane types to be markedly quieter than the generation of turbojets that were developed in the late 1950's and early 1960's. Since the adoption of Part 36, the FAA has issued a number of notices proposing amendments to its provisions and, subsequent to notice and public procedure, has adopted those amendments which have been found to conform to the statutory authority and responsibility conferred upon the FAA by the Congress. Those amendments have increased the protection of the public health and welfare by providing the control and abatement of aircraft noise and sonic boom under § 611 of the Federal Aviation Act of 1958, as amended. Further amendments and proposed amendments are currently under consideration by the FAA for future issuance.

In considering amendments under the authority of § 611 of the Act, factors which the FAA must consider include the following:

1. Available data relating to aircraft noise, including the results of research, development, testing, and related evaluation activities.

2. The views and positions of other Federal, State, and interstate agencies.

3. Whether the proposed regulations are consistent with the highest degree of safety in air commerce and air transportation in the public interest.

4. Whether proposed regulations are: (a) Economically reasonable; (b) Technologically practicable; and (c) Appropriate for the particular types of aircraft, aircraft engines, appliance, or certificates to which they would apply.

5. The extent to which the proposed regulations contribute to providing protection to the public health and welfare by carrying out the purpose of § 611 of the Act.

The overall environmental impacts of the proposed regulations (including environmental factors other than noise) must be assessed in accordance with the National Environmental Policy Act of 1969, and implementing Federal guidelines and directives.

Further, in exercising the authority under the Act, § 1102 requires the Administrator to do so "* * * consistently with any obligations assumed by the United States in any treaty, convention, or agreement that may be in force between the United States and any foreign country. * * *"

Thus, in furtherance of its aircraft noise policy and its responsibility to issue appropriate rules for the control and abatement of aircraft noise and sonic boom, the FAA has adopted amendments to the Federal Aviation Regulations (FARs). A summary of those regulatory actions is presented in the preamble to FAR Amendment 91–136 (41 FR 56046; December 23, 1976). FAR Amendment 91–136 prescribes significant noise operating limits for certain U.S. registered civil subsonic turbojet powered airplanes (weighing more than 75,000 pounds) with standard airworthiness certificates, if those airplanes are not engaged in foreign air commerce. That amendment requires affected aircraft to comply with Part 36 noise levels according to a specified schedule before 1985. As stated in the preamble, that amendment "* * * is intended to encourage the introduction of the newest generation of airplanes, as soon as practicable" and provides a compliance schedule to maximize the incentive to replace rather than retrofit older aircraft. This amendment prescribes the noise level standards for that "newest generation of airplanes."

III. Relationship To Recommended Regulation Submitted To the FAA by the EPA (Notice No. 76–22).

As previously stated, on October 1, 1976, the EPA submitted to the FAA its recommended regulation regarding noise level limits and acoustical change requirements for turbojet powered airplanes and propeller-driven large airplanes, pursuant to § 611(c)(1) of the Federal Aviation Act of 1958, as amended by the Noise Control Act of 1972 (Pub. L. 92–574). Section 611(c)(1) of the Federal Aviation Act of 1958 provides that EPA shall submit to the FAA proposed regulations to provide such control and abatement of aircraft noise and sonic boom as EPA determines is necessary to protect the public health and welfare. That section also provides that the FAA "shall consider such proposed regulations submitted by EPA under this paragraph and shall, within thirty days of its submission to the FAA, publish the proposed regulations in a notice of proposed rule making." Accordingly, pursuant to that provision of law, the FAA published Notice No. 76–22 entitled (as corrected) "Proposed Regulations Submitted to the FAA by the Environmental Protection Agency: Noise Levels for Turbojet Engine Powered Airplanes and for Large Propeller-Driven Airplanes" (41 FR 47358, October 28, 1976; and 41 FR 53807, December 9, 1976). A second correction submitted by the EPA (41 FR 53807; December 9, 1976) republished proposed § C36.5(a) to include the proposed text of paragraph (a)(2) which had been omitted in the original EPA submission to the FAA. Pursuant to a notice also published on October 28, 1976 (41 FR 47378), the FAA held a public hearing in Washington, D.C., on December 14, 1976, regarding the proposals contained in Notice No. 76–22. The period for submitting written comments to the regulatory docket for the EPA recommended regulation will close on February 28, 1977.

The FAA has conducted a comparative review of the EPA proposal and the draft provisions of this amendment to determine whether issuance of this amendment at this time would in any manner commit the FAA to a course of action that would conflict with an objective consideration of the EPA proposals under the procedures prescribed in § 611(c) of the Act, or would in other ways impair its ability to discharge its responsibilities under the Noise Control Act of 1972. That review focused on those areas in which the EPA proposals may differ from this amendment with respect to the resulting protection afforded to the public health and welfare from the noise of airplanes to which each would apply. The review also concerned the EPA's analysis and views regarding the specific proposals contained in Notice Nos. 75–37 and 75–37B. The EPA analysis and views are set forth in Notice No. 76–22. The EPA recommends adoption of its proposed rules (Notice No. 76–22) to supplement and complement the respective FAA proposals in certain regulatory areas which it believes are necessary to protect the public health and welfare.

In summary, the review indicates that the EPA proposal would affect the provisions FAR Part 36 in several respects, including (1) amending the applicability provisions in § 36.1 to substitute the words "large propeller-driven airplanes" for the term "subsonic transport category large airplanes"; (2) amending § C36.1 to authorize expressly an "approved equivalent procedure" in showing compliance under Appendix C; (3) amending the sideline noise measuring point provisions (§ C36.3); (4) amending § C36.5 noise level provisions and adding two additional noise reduction stages for airplanes for which application is made for new type certificates (i) on or after January 1, 1980, and (ii) on or after January 1, 1985; (5) amending the takeoff noise test conditions (§C36.7); (6) prescribing a new alternate takeoff test procedure (§ C36.8); and (7) amending the approach noise test conditions (§ C36.9).

Based on its review, the FAA concludes that there is no provision of the EPA proposals submitted on October 1, 1976, or November 29, 1976, that could not be adopted later, as a supplement to this amendment, if adoption is appropriate under the procedure and standards of § 611 of the Act. Furthermore, the FAA, by issuing this amendment at this time, has in no way limited its ability or intent to respond fully to the respective EPA proposals in a manner contemplated by § 611(c) of the Federal Aviation Act of 1958, as amended.

In addition to preserving FAA's ability to take any action that may be shown to be proper under the § 611(c) process, this amendment reflects FAA's awareness of the need for timely action to protect the public from the noise of the affected airplanes. This amendment, thus, establishes immediate criteria for the manufacturers of those airplanes, consistent with the direction in § 611(b) that the public be protected from aircraft noise.

The FAA has consulted with the EPA regarding this amendment. The FAA notes that this amendment may be supplemented by further amendments on the basis of comments received in response to the EPA proposals (issued as FAA Notice No. 76–22) and that it will proceed to consider issuance of an amendment regarding acoustical change requirements for Stage 2 airplanes and reduced takeoff and sideline noise level

limits for Stage 3 airplanes based on proposals contained in Notice No. 75-37 or Notice No. 75-37C. Considering the public need for timely action and the fact that final action on all of the provisions of the corresponding EPA proposals that are shown to be appropriate can be fully and objectively taken under § 611(c) of the Act, the FAA believes that it would be contrary to the public interest, and to the intent of § 611, to delay this immediately available regulatory action until the regulatory process prescribed in the Act is completed anew with respect to the recent EPA proposals.

IV. Background: The Need for This Amendment

Under the Federal Aviation Act of 1958, as amended by Public Law 90-411 and the Noise Control Act of 1972 (Pub. L. 92-574), the Federal Aviation Administration (FAA) is responsible for aircraft noise regulation and is directed to afford present and future relief and protection to the public health and welfare by control and abatement of noise, consistent with the requirement that the FAA consider whether noise abatement regulations are consistent with the highest degree of safety in air commerce in the public interest and are economically reasonable, technologically practicable, and appropriate to the type of aircraft. As previously stated, the FAA adopted Part 36 of the Federal Aviation Regulations (FARs) in 1969, pursuant to § 611 of the Act. Part 36 specifies noise limitations, based on gross weight, measured at three specified points under the takeoff flight path, on the sideline from the extended centerline of the runway, and under the approach flight path. The noise level at each of these points is measured as an effective perceived noise level (EPNL), in units of EPNdB; the EPNL of an event is calculated by a procedure that accounts for loudness, the presence of discrete tones, and the duration of the noise.

Part 36 halted the escalation of aircraft noise at its source. The relatively low noise levels achieved by the current generation of widebody jets with high bypass ratio engines—the Boeing 747, Lockheed L-1011, and McDonnell-Douglas DC-10—serve to demonstrate the effectiveness of the regulation. FAR Amendment 36-2 extended the requirements of Part 36 to most newly manufactured transport category and turbojet aircraft (produced after December 31, 1973), regardless of the date of application for type certificate. This "new production rule" applies to aircraft with maximum gross weights of more than 75,000 pounds; however, aircraft powered by the JT3D engine, and weighing 75,000 pounds or less, were brought under the rule on January 1, 1975. It was adopted after research had shown that technology allows these earlier aircraft to achieve the noise levels of Part 36.

Recently, the FAA issued an amendment to the Federal Aviation Regulations (FAR Amendment 91-136; 41 FR 56046; December 23, 1976), to achieve further relief and protection to the public from aircraft noise by requiring certain previously excepted turbojet powered airplanes to meet current Federal noise standards or to be retired in accordance with a phased time schedule ending January 1, 1985.

Even with those significant Federal actions, aircraft noise is currently a significant annoyance for six to seven million persons in the United States. The problem is particularly serious at some of the major airports. As air travel increases, noise may become a significant problem for residents living near many other airports across the nation.

The aircraft noise issue became increasingly important in the early 1960s as airlines introduced jet aircraft to their fleets. The rapidly increasing number of commercial jet operations in the latter part of the decade further increased the importance of this problem. Because of its adverse effect on people, noise was soon recognized as a major constraint on the further development of commercial aviation. The engine manufacturers and the Federal Government both engaged in extensive research into quieting jet engines. In 1968, Congress gave the FAA the responsibility to regulate aircraft design and equipment for noise reduction purposes, and the FAA then embarked upon a long-term program of controlling aircraft noise at its source.

Of the six to seven million persons subject to significant aircraft noise, approximately 600,000 reside in areas that are severely impacted. Severe noise impacts include disturbances of the normal activities of airport neighbors—their conversation, sleep, and relaxation—and degrades the quality of life. Based on an analysis of citizen and Congressional complaints, the imposition of airport use restrictions, litigation, and the number of persons affected, the FAA has identified many airports where noise is an issue. The affected airports are identified in the Policy Statement.

As a result of the impact of aircraft noise on airport neighbors, serious pressures have developed that could threaten the continued growth of a healthy air transportation system. These pressures include restrictions on airport usage such as curfews, restrictions on the use of certain aircraft, opposition to airport development, and serious liability exposure for existing airports. For example, over the past five years, airport proprietors have paid out over twenty-five million dollars in legal judgments and settlements in noise related suits and have spent over three million dollars in legal fees and other legal defense costs. This is in addition to the monies being spent by airport proprietors in acquiring land adjacent to their airports and soundproofing affected buildings such as schools, residences, and public buildings.

The critical conclusion coming out of the many years of FAA review of this problem is that, both from the standpoint of the quality of life in airport environments and from the standpoint of the preservation of a strong airport/air transportation system, Federal action is required to provide effective aircraft noise reduction at its source. The normal incentives of the private marketplace are not expected to achieve this. In that regard, the issuance of FAR Amendment 91-136 provided an incentive for the introduction of the newest, quieter and more efficient airplane types, as soon as practicable. The FAA encourages the replacement of retired aircraft with airplanes which comply with the noise standards adopted in this amendment.

The FAA has consistently stated that reduced Part 36 noise levels would be adopted when it is determined that improved noise reduction techniques are available and that it is economically reasonable to require their application. As stated in the preamble to the original FAR Part 36 (1969), as technology makes further reasonable noise reductions possible, the FAA will act to ensure that the lowest reasonable noise levels are achieved. The FAA is firmly committed to lowering the prescribed noise limits consistent with the constraints of § 611 of the Act.

This amendment to FAR Part 36 is based on the twofold premise—that technology making reasonable noise reductions possible is now available and that to "ensure that the lowest reasonable noise levels are achieved" in all aircraft requires that the new standard differentiate among aircraft according to the number of engines. Both these assertions are supported by the experience gained with aircraft certificated under the current standard. Thus, this amendment is needed to ensure that currently achieved noise reduction is preserved and that future aircraft types more fully utilize the noise suppression technology which has been and will be developed.

This amendment to FAR Part 36 standards is necessary to establish an "equal technology standard" that requires the application to all aircraft of the best available economically reasonable noise suppression technology. At the present time application of this level of suppression for the larger turbojet aircraft is essentially defined by the high bypass ratio engine with sound absorbent linings incorporated in the nacelle and engine ducts. While this technology has been utilized primarily in large, widebody jets, powered by engines rated at from 40,000 to 50,000 pounds thrust, the FAA believes that it should be effective in reducing noise in other aircraft. Indeed, smaller engines with higher bypass ratio design have been developed. Two manufacturers are developing engines in the so called ten-ton class (20,000 to 30,000 pounds thrust); these may be suitable for advanced aircraft comparable in size to the present narrowbodied commercial transport. At least one other high bypass ratio engine has been developed in the 6,000 pound-thrust class which could be used in smaller aircraft down to about 30,000 pounds maximum weight. These projects indicate that the application of high bypass technology to smaller aircraft is

economically reasonable; thus, the FAA believes that other aircraft types can achieve noise reductions comparable to the widebodies.

At the lower end of the thrust spectrum, engines of less than 5,000 pounds thrust employ a lower bypass ratio dictated by engine size limitations; thus, the noise standards adopted in this amendment for small turbojet aircraft are based on the performance of medium bypass ratio engines which are both economically and technologically appropriate for aircraft powered by engines in this thrust class. Those aircraft are mostly business jets with maximum weights of less than 25,000 pounds. These new turbofan engines with bypass ratios of approximately 3:1 (compared with 5:1 or 6:1 for the typical large high bypass ratio engine) have been demonstrated to generate much less noise than their predecessors, which were mostly pure turbojets.

The EIS contains data showing the Part 36 noise levels generated by aircraft that currently employ advanced noise suppression technology (i.e., high bypass ratio engines and sound absorbent linings or, in the case of relatively light, business jet type airplanes, medium bypass ratio engines). The equal technology standard adopted by this amendment requires that new aircraft designs employ noise suppression techniques at least as effective as those demonstrated by these aircraft. Approach data taken from FAA certification experience show that with the higher bypass engines, widebody aircraft and business jets at entry into service were able to achieve noise levels below current Part 36 standards. Accordingly, this amendment adopts approach levels that are 3 to 4 EPNdB below current limits. The sideline noise data show the greatest differences between present standards and actual certificated levels for both the widebody jets and the business jets. Because these results clearly show that levels substantially below Part 36 are being achieved at entry into service, this amendment adopts significant reductions in allowable sideline levels from 5 to 8 EPNdB with the size of that reduction varying according to number of engines and weight. Takeoff noise level reductions between 1 to 9 EPNdB below current limits are adopted by this amendment.

Since all the widebody aircraft represent essentially the same level of noise suppression technology and the limits are designed to account for noise increase with weight, the current Part 36 levels do not represent an equal technology standard. That deficiency can be illustrated by considering the number of engines on the aircraft (the A–300B has two engines, the DC–10 and L–1011 three, and the B–747 four). The number of engines affects preceived noise level through aircraft performance. Generally, two engine aircraft tend to pass over the 3.5 nautical-mile takeoff noise measurement point at higher altitudes than four engine type of the same weight and, thus, appear to be quieter. Aircraft with fewer engines tend to reach the measurement point at greater altitudes for several reasons. Airworthiness regulations require that aircraft maintain a certain gradient with one engine inoperative; a two engine design must maintain its required gradient with only 50% of its total installed thrust available, while a four engine type has 75% power available; therefore, the two engine aircraft at full power generally will be able to achieve a steeper climb than one with four engines. In addition, two engine aircraft tend to have shorter takeoff rolls than other types, since they are designed to serve smaller airports. Thus, the number of engines is a significant factor in determining the altitude that aircraft can be expected to achieve at the 3.5 nautical-mile measuring point. Since each aircraft of the same weight, regardless of the number of engines, would create essentially equivalent noise levels at the source, the difference in sound levels observed on the ground largely results from differences in altitude.

For aircraft powered by high bypass ratio engines, it appears that current technology is capable of achieving takeoff noise levels several EPNdB below Part 36 levels for four engine aircraft, levels somewhat farther below Part 36 levels for three engine types, and still lower levels for two engine types. This amendment lowers the FAR Part 36 noise levels, depending on weight, from approximately 1 to 6 EPNdB for four engine aircraft, 3 to 8 EPNdB for three engine types, and 3 to 9 EPNdB for two engine types. It also reduces the rate of the takeoff noise limit increase from 5 to 4 EPNdB per doubling of weight. This rate reflects a practical compromise between the theoretical prediction that a doubling of thrust should lead to a 3 EPNdB increase in noise and the experience gained with certifications to date. Accordingly, the rate of allowable sideline noise increase for airplanes having 3 or fewer engines is increased from 2 to 2.56 EPNdB per doubling of weight.

The certification experience with takeoff noise levels for the business jets show that they fall well below the Part 36 standard of 93 EPNdB. (The standard is constant at this level for all weights less than 75,000 pounds.) This amendment retains the concept of a constant limit in the lower weight range, but reduces the takeoff noise limit for airplanes with 3 and more engines by 3 EPNdB to 90 EPNdB and by 4 EPNdB to 89 EPNdB for airplanes with fewer than 3 engines. Since all the business jet aircraft certificated to date have 2 engines, further reductions due to the effect of the number of engines was not established for those airplanes with 3 or more engines under Notice Nos. 75–37 and 75–37B. Accordingly, and as proposed, the level for light weight three and four engine types is established at 90 EPNdB at this time. Further, consideration is being given to that matter under Notice No. 75–37C.

V. Comments on the Proposed Rule

As previously stated, interested persons have been afforded the opportunity to participate in this rulemaking by submitting comments to regulatory docket for Notice Nos. 75–37 and 75–37B. Those written comments have been reviewed and considered in the issuance of this amendment.

More than 25 comments were received from a range of interests, including individual private citizens; civic and environmental groups; state and local governmental authorities, a foreign governmental body; airport operators and operating authorities; aircraft operators; foreign and domestic aircraft and aircraft engine manufacturers; and aviation trade/industry associations. The FAA also recognizes the public concern for aircraft noise problems expressed in other recent FAA regulatory actions and has considered those views to the extent that they are relevant to the issues involved in this amendment. A more detailed discussion of that concern appears in the preamble to FAR Amendment 91–136 (41 FR 56046) and in the Policy Statement.

The issues focused on by commenters include: the options or alternatives to the proposed rule that may be available; the impacts of the proposed acoustical change requirements, the impacts of the noise level limits (including costs versus benefits, economic reasonableness, technological practicability, compliance dates, the need for tradeoffs and thrust cutbacks, and the appropriateness to particular aircraft types); interaction with international standards; and other miscellaneous issues. These comments are discussed as follows:

A. Alternatives to the Proposed Rule

Commenters to this and previous rulemaking dockets have expressed their support for the goal of aircraft noise reduction or, more generally, the need for appropriate action to abate the impact of noise annoyance in the airport environment. In responding to the issues involved in the proposals contained in these notices, many commenters recognized the broader issues of aircraft noise control going beyond source noise reduction and discussed the various methods which may be used to achieve noise relief and reduce noise impact on the community. Many Commenters recognized, however, that most of those alternatives are beyond the scope of the Notice No. 75–37. One of those alternatives is specific flight procedures. Other alternatives cited included matters beyond direct FAA control, such as land-use controls.

The FAA agrees with those commenters who recognize that this rulemaking action will not resolve the entire aircraft noise matter. It will not silence all complaints of annoyance or injury because of aircraft noise. The FAA also agrees with those commenters, who believe that this amendment is a necessary step toward achieving beneficial reductions at the noise source and will contribute to making aircraft and airports more compatible with the communities they affect. As several commenters have noted, a comprehensive national program combining the various noise control and abatement techniques is needed to

achieve the necessary protection to the public health and welfare. A discussion of these other noise reduction techniques is contained in the Policy Statement.

The FAA does not agree with those who believe that the use of specific noise abatement operating/flight procedures (or combination of procedures) would, by itself, provide the necessary noise control and abatement. Further, some persons mistakenly believed that using an operational procedure during the flight of a noncomplying aircraft can serve as a substitute for compliance with noise type certification and acoustical change standards. While some procedures help to minimize the generation or the propagation of noise from the aircraft in flight, their benefits to the public health and welfare are most significant when combined with other effective techniques, such as source noise control. Operational procedures are not a substitute for, but complement to control and abatement of noise generation at its source.

Unless future reductions in aircraft noise emissions at the source completely satisfy the need for protection of the public health and welfare, supplemental action by aircraft and airport operators and state and local governmental entities will continue to be needed. However, the FAA believes that the fact that non-Federal action is necessary is not a justification for delaying strong Federal action to bring about that part of the overall solution that is within Federal control.

Some persons have pointed to local airport measures as alternative means of achieving noise control. Since many of these matters are within the authority and control of the local community, the FAA cannot ensure that they will be acted upon. The FAA agrees with those who stress the important role of aggressive local action, including planned airport development, zoning and related land-use controls, and the use of sound suppression materials in certain buildings in achieving the desired reduction of aircraft noise impact on local communities. However, the FAA does not agree with the suggestion that the noise impacted communities or any single segment of the air transportation system should bear the full burden of reducing aircraft noise around airports. As previously stated, the combined effort of the various elements of a comprehensive noise program is, and is expected to continue to be, necessary to achieve the required protection to the public health and welfare. This amendment is a significant Federal contribution to that comprehensive program."

B. IMPACT ON THE PUBLIC

The disruptive effect of aircraft noise on the quality of life, and on the air transportation system and is discussed in detail in the Policy Statement. Private citizens; citizens groups; Federal, State, and local authorities; and in particular, airport operators and proprietors have stressed the need for present, as well as future, aircraft noise reduction requirements. The noise of transport category large airplanes and turbojet-powered airplanes has been cited as a principal target for such reductions by many commenters to rulemaking dockets. The FAA agrees that technology must be applied in the further reduction of noise of those aircraft. This amendment accomplishes that result consistent with the considerations listed in § 611(d) of the Act.

The public concern regarding the perceived impacts of aircraft noise has been duly noted and comments on aircraft noise abatement proposals were found to be useful and informative. Those comments have assisted the FAA in determining, after due consideration of all comments, that the economic impacts imposed by this amendment are reasonable and appropriate in relation to the benefits to be achieved.

C. ACOUSTICAL CHANGE REQUIREMENTS

As stated in the preamble to Notice No. 75-37, in proposing to establish reduced noise level standards, the FAA considered the fact that a new airplane design is generally "grown" over its lifetime, either by increasing its capacity, its range, or both. While each results in an increased public transportation capacity, it usually also involves an increase in aircraft weight, reduced climb performance, eventually the need for increased thrust, and thus, the potential of increased noise levels. Planning and allowance for that aircraft growth are basic factors in the economic viability of aircraft design programs. But unfortunately, that growth may also evolve into increased perceived noise levels of single event and community noise exposure. The proposed reduced noise level standards, therefore, included requirements governing acoustical changes for subsequent generations of new types of aircraft when the change in type design may result in noise increases.

Notice No. 75-37 proposed, and this amendment adopts, specific requirements for acoustical changes for each of the three designated airplane stages. Within the scope of Notice No. 75-37, this amendment prohibits the escalation of noise levels above those that the FAA has determined are consistent with the purposes and requirements of § 611 of the Act in providing protection to the public health and welfare. For Stage 1 airplanes (all airplanes that are noiser than current Appendix C noise limits, including those of older type designs still in the fleet), the FAA proposed to apply the current requirements in § 36.7(a)(2) by not permitting noise levels after a change in type design to be increased above those created before the change in type design. Under the proposed rule, Stage 2 airplanes (those airplanes that have been shown to comply with current Appendix C) for which application is made before November 5, 1975, would be permitted to continue to increase noise level emissions up to the current Part 36 noise limits. After that date, the proposed rule would only allow noise level increases proportionately with increased maximum weight of the airplane in accordance with the ratio of noise limit to maximum weight reflected in the current Part 36 noise limits, which are designated as "Stage 2" noise limits in this amendment. The tradeoff provisions could not be used to increase an exceedance of a Stage 1 noise level but could be used, within specified limits, with respect to Stage 2 noise levels. Tests conducted before the change in type design would be required at the quietest airworthiness approved configuration available for the highest takeoff weight. In addition, under the proposal, for airplanes for which application is made after May 5, 1976, power or thrust cut backs would not be allowed in showing compliance. Stage 3 airplanes (those that create noise levels at or below the proposed reduced or "Stage 3 noise level" limits) for which the application for acoustical change approval was made before November 5, 1975, would be permitted to increase noise levels after a change in type design up to the Part 36 (proposed "Stage 2") noise limits and thereby become a Stage 2 airplane after the change under the rule. Under the text of the proposed rule, if the application was made on or after May 5, 1976 (six months after the application was made on or after May 5, 1976 (six months after publication of the NPRM), the airplane must remain a Stage 3 airplane and, accordingly, any noise increase would be restricted to those levels at or below the reduced or "Stage 3" noise limits. Both the tradeoff provisions and power or thrust cutbacks could be used to show compliance under the proposal, regardless of the date of application.

Most commenters addressed the acoustical change proposals and focused their strongest criticisms on those aspects of the proposed rule as it applies to Stage 2 airplanes. Those commenters stated that the acoustic change provisions would impose severe and unreasonable restrictions and economic impacts on virtually all future growth versions of turbojet powered airplanes currently in production. Many commenters also objected to the proposal because the smaller aircraft (those below the respective noise floors at weights varying according to the number of engines) would not be permitted any increase at all in noise emission levels regardless of weight increase. The aviation community (including non-manufacturing interests) uniformly viewed such restrictions on already planned for growth of current production Stage 2 airplanes as not being economically reasonable or practicable. Many commenters noted that the early growth versions of the yet quieter Stage 3 airplanes (those for which application is made before May 5, 1976) were not similarly restricted to Stage 3 noise levels but could increase noise levels, even without corresponding weight increases, all the way up to the current limits of Part 36. Those commenters frequently stated that such unequal treatment is inherently unwise, unfair, and unreasonable and would seriously affect the competitive structure of the market place among the affected aircraft. According to those commenters, the effect would be contrary to the interests of the air

transportation industry and a healthy air transportation system and would not be consistent with the purposes or requirements of section 611 of the Act.

Several comments generally took exception to the basic concept of the proposed acoustical change requirements as being an unsupportable departure from the current provisions. Many of these commenters felt the restriction upon growth of the aircraft "family" should not be based upon the entry into service, or "parent" aircraft within a specified noise levels stage, since it would eliminate the incentive to apply the most effective sound suppression technology on the earlier versions in order not to establish unnecessary restrictions on later growth. Many stated that the concept behind the proposal is basically faulty and misconceived and would encumber the industry with excessive details, increased costs, and limit necessary flexibility within the industry programs without contributing substantially to community noise reduction. Some commenters felt that the proposed provisions are ambiguous and susceptible of more restrictive interpretations than those explanations highlighted in the preamble to Notice No. 75–37.

Strong opposition was also expressed to the limitations on power or thrust cutbacks and tradeoff provisions, as applied to acoustical changes of certain Stage 2 airplanes after May 5, 1976. Many commenters stated that retesting of the parent aircraft to obtain the necessary "before change" data, which would be necessary in many cases where the airplane was previously certificated under different requirements, would not be realistic or economically reasonable.

Several comments were received which stated that use of power or thrust cutbacks, as well as the tradeoff provisions under § C36.5(b), which are currently permitted in showing compliance, should be permitted for all Stage 2 and Stage 3 airplane noise tests. One commenter contended that, in order to achieve the 90 percent confidence level required for the validity of test results under Appendix A, tradeoffs are needed during the tests both before and after change in type design. Similarly, other commenters stated the tradeoffs and thrust cutbacks are needed to accommodate design/flight performance differentials that are inherent in airplane design programs. Several commenters presented their views, and supporting data, for the continuing need for power or thrust cutbacks to achieve the proposed noise levels reductions.

Some commenters recommended using the same noise test procedure and conditions for all subsequent versions of the aircraft, regardless of intervening amendatory action. Other practical and technical questions were raised by commenters who opposed adoption of the acoustical change proposal. It was suggested that the proposals should be reconsidered since they involve complex and far-reaching implications which have not been shown to be realistic in application and which may not be completely understood or appreciated at this time.

After careful review of the proposed acoustical change requirements for all three airplane stages and of the seriousness of the certain impacts identified in the comments and the supporting data submitted to the docket, the FAA has determined that, at this time, it should not adopt the major portion of those Stage 2 airplane acoustical change requirements as proposed in Notice No. 75–37. Further review and consideration of the overall Stage 2 airplane acoustical change requirements issue is necessary to ensure that those requirements that are adopted are consistent with the purposes and requirements of the Noise Control Act of 1972. However, this decision to continue its consideration of the Stage 2 acoustical change proposal does not prejudge any future FAA regulatory action. Neither does it preclude later adoption of amendments based upon those proposals announced in Notice No. 75–37 or other NPRMs recently issued by the FAA. In that regard, and as previously stated, two other notices of proposed rule making (Notice Nos. 75–37C and 76–22), which include acoustical change requirements proposals, have been issued. In accordance with the FAA's commitment to seek substantial uniformity in aircraft noise standards on an international basis through ICAO, the FAA proposed in Notice No. 75–37C certain alternative acoustical change provisions based upon the international standards recommended by ICAO. Also, Notice No. 76–22 contains the recommended regulations submitted to the FAA by the EPA. The regulatory dockets for both of those NPRMs are still open to receive public comments. After the close of those comment periods, the FAA will consider further amendments based on the proposals contained in, and the comments received on, Notice Nos. 75–37, 75–37B, 75–37C, and 76–22.

Accordingly, this amendment revises § 36.7 to reflect the classification of the respective airplane and noise level stages and to prescribe the appropriate acoustical change requirements. Also, the current provisions of paragraph (b) regarding acoustical changes for propeller-driven small airplanes are redesignated under § 36.9, without substantive change.

Comments with respect to the Stage 3 airplane acoustical change rule were generally more favorable. A major concern expressed was that the regulatory concept of further acoustical change restrictions, like those proposed for Stage 2 airplanes, would eventually also be proposed for Stage 3 airplanes. Commenters stated that the impacts of such additional limitations on noise increases for growth versions of airplanes in production would thwart the manufacturers' ability to receive the planned for economic return on the basic aircraft design investment. Thus, the commenters expect the same impacts on Stage 3 airplanes as those they expressed with regard to proposed acoustical change rule for Stage 2 airplanes. While the FAA appreciates that concern, Notice 75–37 proposed only to limit acoustical change noise levels for Stage 3 airplanes applied for on or after May 5, 1976, to the proposed Stage 3 noise limits. Thus, those comments addressed possible rules which are beyond the scope of this rule-making action.

Several commenters suggested that all Stage 3 airplanes be permitted noise increases up to the current Part 36 noise limits (i.e., Stage 2 noise limits). The FAA does not accept that suggestion since it would have the effect of eventually negating the noise reductions for Stage 3 airplanes adopted in this amendment. The required noise reduction would be meaningful only for new airplane type designs at their entry into service. The environmental benefits achieved by applying the existing noise reduction technology would be forfeited if the acoustical change rule authorized virtually unrestricted noise increases for growth versions of Stage 3 airplanes. Such a rule would not provide the needed noise control and would not be consistent with the requirements of the Noise Control Act of 1972. The Stage 3 noise limits adopted in this amendment reflect consideration of the need for growth of those airplanes and, if properly accounted for in design planning, include the appropriate margins of noise increase for growth of Stage 3 airplanes during a reasonable life for their type design.

This amendment adopts, in modified form, the proposed requirements for Stage 1 airplanes, without substantive change. These requirements are essentially the current acoustical change rule for airplanes that cannot achieve the current Part 36 noise limits. The definition of Stage 1 airplanes has been clarified to include those airplanes that have not been shown to comply with Part 36 noise limits, as well as those that have actually been shown to exceed those limits. For Stage 2 airplanes, this amendment retains, in modified form, the current requirements for those airplanes that can achieve the current Part 36 noise limits.

This amendment adopts, in modified form, the proposed requirements for Stage 3 airplanes. The provisions of § 36.7(e)(1) clarify the expressed intent of the proposal to apply the Stage 2 acoustical change requirements to those airplanes defined as Stage 3 airplanes where compliance to Stage 3 noise levels is not required prior to the change in type design. Thus, those airplanes may either become Stage 2 airplanes or remain Stage 3 airplanes after a change in type design and show compliance accordingly. As adopted, the rule also clarifies the compliance date of requirements for Stage 3 airplanes. As adopted, the rule applies to applications made on or after May 5, 1976. The FAA has analyzed the details of comments and supplementing data submitted to the docket regarding the Stage 3 acoustical proposals, particularly with respect to the application of available technology and the Stage 3 noise level limits adopted in this amendment. The FAA concluded that, first, a firm noise limit applicable to the new type design airplanes is needed and that the noise limits adopted

in this amendment as applied to acoustical changes are economically reasonable and technologically practicable, and second, because this amendment encompasses both new type certificates and acoustical change approvals, compliance at or below the prescribed noise limit should be applicable to Stage 3 airplanes in accordance with the NPRM in both instances. The FAA also concluded that to permit acoustical changes to Stage 3 airplanes for which application for type certification is made after May 5, 1976, to continue to increase above the prescribed Stage 3 levels would not be consistent with its responsibilities under section 611 of the Act to provide the current and future relief from aircraft noise. After considering all the issues discussed by commenters, those in the Policy Statement, and those discussed in the EIS regarding those options that might be selected in prescribing an acoustical change rule, the FAA has determined that this amendment is economically reasonable, technologically practicable, and appropriate to the particular aircraft types and certificates to which it applies. However, as previously stated, additional amendments to the Stage 2 acoustical change rule are being considered for future adoption, as proposed in Notices Nos. 75–37C and 76–22.

D. NOISE LEVEL REQUIREMENTS

As previously discussed with respect to the need for this amendment and in the NPRM, in the Policy Statement and in the EIS, the FAA proposed to ensure that the lowest airplane noise levels are achieved consistent with the constraints of section 611 of the Act. Thus, this amendment adopts noise limits which ensure that currently achieved noise reduction is preserved and that future aircraft types more fully utilize the noise suppression technology which has been, and will be, developed. The noise standards adopted in this amendment specify an "equal technology standard" that requires the application of the best available economically reasonable noise suppression technology to all airplanes under new type certificates.

Many commenters addressed the reduced, or "Stage 3," noise level limits proposed for airplanes for which application for type certification is made on or after November 5, 1975. Some commenters believe the noise limits should be lower, others contend that they were too low or that compliance should be delayed until compliance with the requirements would be economically reasonable or technologically practicable. Several commenters expressed their dissatisfaction with the proposed continuation of the minimum "noise floor" concept for airplanes below certain maximum weights. Opposition to that concept was stated for contrary reasons. One view favors further reduction of the permissible noise levels by applying the rate of noise reduction per halving of maximum weights to all aircraft regardless of weight, because the leveling off points for takeoff, sideline, and approach noise limits that create a "noise floor" are set at levels that are too high without any apparent reason. The other view contends that those airplanes under the noise floor are subject to more stringent limitations on acoustical changes than those having the higher maximum weights. Another commenter suggested that the proposed "noise floor" fails to require the most effective application of available noise reduction technology and, thus, results in an unjustified impact on many smaller airports served by those airplanes. Many commenters have objected to the failure to have proposed, and adopted, more stringent noise level requirements before now, stating that further reductions have been needed and were technologically possible for several years.

Based on its analysis of the respective noise level limits for airplanes in the lower weight range, the FAA concludes that the limits adopted by this amendment adequately take into account a full consideration of the various factors raised by those comments. The noise floor concept results from the physical limits of an aerodynamic (airframe) noise floor, as well as from the need to provide rules of appropriate stringency for all aircraft types, regardless of weight. Certification experience has shown that the equal technology standard objective of this amendment requires recognition of basic distinctions in the manner in which the available noise suppression technology may be applied to the wide range of airplane weights and designs. As indicated in the NPRM, the smaller airplanes have not, as yet, experienced their growth or technological potentials and have specific limitations on application of the higher by-pass ratio engines and sound absorbent materials. However, the noise limits prescribed represent the levels consistent with the best available economically reasonable noise suppression technology that may be adopted under the levels proposed in Notice No. 75–37. In that regard, the FAA notes that certain differences in the respective noise levels are proposed in Notice No. 75–37C; those further reductions are being considered for adoption as refinements of the levels adopted in this amendment, in accordance with the considerations of section 611 of the Act.

Some commenters stated their belief that the current Part 36 levels, as a whole, are adequate and that no further reduction is necessary since current levels achieve a sound compromise between health, safety, economic, and technological considerations. Other commenters stated their concern that greater control and abatement should be adopted, particularly for airplanes powered by 3 or 4 turbojet engines. On the other hand, several commenters contend that the certification experience relied upon in proposing the reduced noise limits is not a sufficient basis from which to judge the economic reasonableness or technological practicability of the proposals.,

As stated in the preamble to Notice No. 75–37, the certification experience under Part 36 indicates that the development of noise reduction technology has progressed to the point that significant noise reductions below the current Appendix C can be achieved consistent with considerations of safety, economic reasonableness, and technological practicability for civil subsonic turbojet powered airplanes and subsonic transport category large airplanes. The FAA, therefore, proposed to adopt Stage 3 noise limits which it believed were the lowest limits consistent with considerations of economic reasonableness and technologically practicability. The FAA recognized that the proposals cover a large range of airplane weights and designs and, therefore, suitable criteria for distinguishing among those airplanes were built into the Stage 3 noise limit proposals to reflect the refinements to significant noise emission characteristics. Comments were received in the docket on several of those factors.

Several commenters stated that using the number of engines powering an airplane to differentiate it from among other airplanes oversimplifies the true characteristics of the noise emission potential and is not appropriate. Some felt that such a distinction for sideline noise makes the rule unnecessarily complex. Several commenters cited the ICAO recommended noise reduction standard which employs the number of engines as a factor only with respect to takeoff noise measurements and, thus, would use the same sideline and approach noise level values regardless of the number of engines. Comments and supporting data submitted to the FAA regarding the number of engines generally focused attention upon the takeoff and sideline noise level differences proposed for airplanes with three engines compared with those having more than three engines. Several commenters pointed to the proposed 3 EPNdB difference in sideline noise limits for airplanes weighing more than 90,000 pounds as permitting an airplane to create higher noise levels simply because it has more engines. It was felt that such a difference would create an anti-competitive effect among those airplanes and would unreasonably favor those having more than three engines.

After carefully reviewing the economic and technological aspects of the proposed rule in light of comments and supporting data submitted to the docket, as well as other available economic and technological data, the FAA agrees that a modification of the proposed noise levels is appropriate. Thus, the noise levels adopted in this amendment reflect a refinement of the various factors which distinguish the different classes of aircraft. This is accomplished in a manner consistent with the scope of Notice Nos. 75–37 and 75–37B and with the considerations of section 611 of the Act. The FAA does not agree, however, that the number of engines powering an airplane is not an appropriate factor in prescribing appropriate takeoff and sideline noise limits. For the reasons stated in the NPRM and as analyzed in the EIS, the FAA has concluded that among the vari-

ous quantifiable factors which have been identified, the number of engines, when taken with maximum airplane weight, provides a useful and reasonable basis for distinguishing among the wide range of airplane types and prescribing appropriate standards for takeoff and sideline noise levels in accordance with the considerations under section 611 of the Act. The FAA does not agree with those commenters who suggested that power or thrust criteria should be included as a separate factor in showing compliance with the noise standards. While power or thrust is a consideration which must be taken into account in developing noise standards and in designing airplanes that comply with established noise standards, the FAA has determined that the effect of various power or thrust values and their relationship to airplane weight has been fully considered and properly accounted for in the criteria being adopted for noise tests conducted under the procedures and conditions prescribed in Part 36.

Some commenters suggested that certain other aspects of the proposed reduced noise levels should not be adopted or should be modified in certain respects. It was suggested that the EPNdB rate of increase per doubling of weight for takeoff noise should not be reduced from the current 5 to 4 EPNdB for Stage 3 airplanes. It was stated that 5 EPNdB is needed to provide an adequate incentive to apply advanced noise suppression technology for these airplanes. Substitution in the noise level formula of a rate of noise increase (in EPNdB's) based on power or thrust for the current rate based on airplane weight was also suggested. The rates of permissible noise level increase, including takeoff levels, and the use of increased weight as the basis for permissible noise level increases have been extensively analyzed and reviewed by the FAA and the ICAO Committee on Aircraft Noise (CAN). The certification experiences under Part 36 and Annex 16 and the data generated in conducting certification and acoustical change noise tests indicate that the current state of the art of noise reduction is reasonably and adequately reflected in the relationship of noise level to aircraft maximum weight adopted in Part 36 in 1969, and later in Annex 16 by ICAO. As stated in the NPRM, the proposed rate of noise increase permitted with a doubling of aircraft weight reflects an empirical compromise between the prescribed rate and the basic acoustical principle that an increase of 3 EPNdB results from a doubling of thrust. It serves to retain a limit on the potential escalation of noise while retaining a reasonable growth potential for airplanes at those weights as demonstrated during the certification experience. This amendment adopts the proposed rate of takeoff noise increase (4 EPNdB) and retains maximum weight as the factor against which the respective noise increases are permitted. Also, by so doing, the takeoff noise levels more accurately reflect the consideration of the number of engines and the impact of the airworthiness climb gradient requirements of FAR § 25.121 on the thrust to weight ratio of the airplanes. In that regard, as part of the sideline noise provisions, this amendment also adopts a 2.56 EPNdB rate of increase in the sideline noise levels for airplanes in the three-engine and the fewer-than three-engine classifications. This relaxation of the proposed rate of 2 EPNdB is necessary to adjust adequately the respective changes to the proposed sideline noise level requirements for those classifications of airplanes. As adopted those noise limits are consistent with the maximum proposed noise level reductions which are economically reasonable and technologically practicable at this time.

Opposing views were also received regarding the proposed increase from 600,000 pounds to 850,000 pounds as the airplane weight level at which the highest permissible noise levels, or noise ceiling, would occur under the proposed Stage 3 noise limits. In light of the higher maximum weights of several wide-bodied aircraft designs, one commenter suggested there is ample justification for extending the proposed noise level and weight limits up to at least the 1,200,000 pound point. Another commenter objected to the proposed extension even up to the 850,000 pound point. Both comments have merit to the extent that they recognized that the proposed noise reductions should establish a line representing the various points where the respective takeoff, sideline, and approach noise levels and corresponding maximum weights achieve the maximum noise reduction consistent with the equal application of technology objective of this rulemaking action. Review of all the economic and technological data submitted, indicates, as analyzed in the EIS, that minor modifications to the respective noise levels proposals should be adopted in order to achieve the greatest benefit to the public from aircraft noise reductions that are within the scope of Notice No. 75–37 and consistent with the purposes and requirements of section 611 of the Act. This amendment achieves that result.

Comments were received which suggested that the rule, if adopted, should be restated to indicate clearly that the Stage 3 provisions apply only to future aircraft not already certificated. As previously discussed, the proposed rule does not apply to type certification or acoustical change approvals which have already been completed. The prescribed compliance date for both type certification and acoustical change approvals is governed by the date the application is made. In that regard, many commenters objected to what they viewed as enforcing the proposed amendment "retroactively" to applications filed before the issuance of the final rule, or before thirty days after publication of the amendment. As described in Notice No. 75–37, "while certain of the proposals specified herein would apply to applications that are made on and after the date of this NPRM (but before the effective date of the final rule), none of these proposals would affect approvals (of applications) that are actually issued prior to the effective date of the final rule." That form of applicability date has been proposed and adopted before in amendments to Part 36 when the FAA was concerned with the timing of the effective date of proposed rules because of the significant and enduring impact upon the noise abatement benefits the rules are intended to achieve. Thus, the FAA proposed to apply these proposals to applications made on or after a specified date related to the date of publication of the NPRM. By adopting that part of the proposals, the FAA avoids the possibility of a significant number of applications being submitted in anticipation of the effective date of the final rule but for which FAA approval could not be given before the rule becomes effective (or for years after the rule becomes effective, since applications for certain type certificates do not expire for five years after they are filed). In effect, the NPRM announced the FAA's intention to apply the amended rules, when they became effective, to approvals even though the application was received during the period between the publication date of the NPRM and the effective date of the amended rule. The FAA has concluded, that in those cases, the applicable rules should be those in effect on the date of approval, not the date of application for type certification or acoustical change.

An important criterion used in setting the proposed levels discussed in the notice was the FAA's recognition that aircraft and aircraft engine manufacturers must work within a certain tolerance band in moving from design stage to final product. The tolerance, or design parameter, reflects uncertainties in design and manufacture, and various unknown factors, including variations in noise measurements at the time of noise certification testing. For a new airplane, a tolerance of at least 3 EPNdB is frequently necessary. The tolerance also varies widely for different design changes. As noted by several commenters, there is the risk that a new type design or design change, possibly costing many millions of dollars, might fail to meet the prescribed noise standard. Therefore, the noise levels to which the airplane is designed must be sufficiently below the noise level limit that the entire tolerance band is below the noise standard. At the time the FAA issued its proposals, it stated that it believed that the proposed noise levels would allow sufficient tolerance for manufacturers to develop realistic designs using the best available noise reduction technology with reasonable assurance that the final product would satisfy the noise standard. (Two other major considerations in establishing the FAA proposed limits, the application of the most advanced noise suppression technology achieved by presetnt day airplanes, and accounting for the basic factor of growth versions of an airplane in its economic viability, have already been discussed.)

Several comments were received from commenters who felt that an anticipated

proposed rule changes to Appendices A and B of Part 36, regarding the procedures and conditions for conducting noise tests and evaluating noise test data, might have a significant impact on their comments regarding the proposed noise levels and acoustical change requirements in Notice No. 75–37 because such things as basic design parameters may be affected. Some of those commenters stated that they were concerned that amendments to the noise test procedures and conditions would significantly increase the stringency of the instant proposal. On October 28, 1976, the FAA did propose substantial changes to Appendices A and B (Notice No. 76–21; 41 FR 47342); however, as indicated in that NPRM, the anticipated impact of the proposals does not involve any significant increase or decrease in the resulting noise levels but would contribute substantially to improving the consistency and repeatability of noise test data under the proposed requirements.

The FAA recognizes the interaction between noise test methodology and the noise level measurements which result. While no significant change is expected from the proposed amendments to Appendices A and B, the FAA will consider the potential of those impacts in reviewing the proposals and comments to the docket before taking any action regarding Notice No. 76–21.

Notice No. 75–37 proposed that the sideline noise measuring point should be the same for all Stage 3 airplanes, regardless of the number of engines. The distance of 0.25 nautical miles from the runway centerline was proposed. Under the current rule, that distance is applied to airplanes powered by two or three turbojet engines and to all non-turbojet transport category large airplanes. Currently, airplanes powered by four turbojet engines are measured at a distance of 0.35 nautical miles. Several commenters agreed with the proposal but several others recommended either that the current rule should also be applied to Stage 3 airplanes or that the 0.35 nautical mile distance should be used for all Stage 3 airplanes. Some commenters stated that the proposed Stage 3 sideline noise levels could not be achieved by four engine, and perhaps some three engine, airplanes. The FAA has reviewed the proposed rule in light of the comments received and concludes that it should be adopted without change. A distinction in sideline noise levels between three and four engine airplanes is indicated in the certification experience and other data. The FAA believes, however, that demonstrated differences are adequately reflected in the respective noise limits presented for those airplanes. A 0.35 nautical mile distance for a four engine airplane would result in a significantly less stringent noise standard at the higher weight range than that required for a three engine airplane with the same maximum weights under the noise limits adopted in this amendment. As discussed in the EIS, the objective of requiring equal application of the best available noise suppression technology is thus achieved in this amendment without prescribing different noise measuring point distances for three and four engine airplanes.

One commenter also suggested that the altitude at which a thrust cutback is permitted for airplanes having three or fewer engines should be reduced from 1,000 feet to 700 feet for comparability with four engine airplanes. A major reason stated for that change was that certain airplanes do not achieve the higher altitude during noise tests before reaching the 3.5 nautical mile takeoff noise measuring point and, thus, are required to show compliance without thrust cutbacks where an airplane having four engines would be permitted to use a thrust cutback. Since the notice did not propose to amend section C36.7(b), which contains the provisions involved, the suggested amendment is beyond the scope of Notice 75–37. However, the FAA does not believe that such an amendment is necessary because the respective noise level limits for Stage 3 airplanes adopted in this amendment adequately reflect the various factors which differentiate the noise emission potential and noise test requirements of the various affected airplanes.

Before adopting this amendment, each component factor of aircraft noise emission was considered in relationship to the applicability and stringency of the noise standard, as well as the consistency of the standard with the purpose and requirements of the Noise Control Act of 1972. Accordingly, the FAA proposed in Notice No. 75–373B, and this amendment adopts, the supplemental proposal to Notice No. 75–37 regarding application of the proposals to single-engine turbojet powered airplanes in all categories, and all single engine airplanes in the transport category, regardless of engine type.

Many of the comments received concerned the economic impacts of the proposed rules on aircraft manufacturers, and aircraft owners and operators. The commenters concentrated primarily on the cost impacts of the proposed acoustical change rule for Stage 2 airplanes, the reduced (i.e., Stage 3) noise level limits, and the Stage 3 airplane acoustical change rule. The FAA has fully reviewed these factors and concludes that the regulation adopted in this amendment adequately and properly accounts for the cost impacts involved. Economically reasonable noise reduction technology is available for the affected airplanes. The compliance/applicability dates of the provisions of this amendment were selected to provide application of currently available noise reduction technology at the earliest date that is economically reasonable and consistent with the significant and enduring impacts upon the noise abatement benefits the rules are intended to achieve. Deferring those environmental benefits would not be in the public interest or consistent with the FAA's responsibility under the Noise Control Act of 1972 to provide current and future relief from aircraft noise through appropriate noise control and abatement regulations.

The major concerns for the cost impact of the proposed rules addressed by most commenters were with respect to the Stage 2 acoustical change proposal. They focused upon the costs involved in applying the proposed further limitations on the growth versions of aircraft already certificated under Part 36 and in-production aircraft. Many commenters stated in effect that, since the economic viability of an airplane design program depends in significant measure on the ability to modify the basic design at various times during the life of the aircraft, the substantial change proposed would not permit realization of planned-for growth. According to commenters, those restrictions would be economically unreasonable and would have far reaching economic implications to the aviation industry and the national and international air transportation systems. As previously stated, the FAA believes that the reasoning and views of these comments appear to have merit and the FAA has decided that it should not adopt the major portions of the proposed Stage 2 acoustic change rule at this time. The cost information and data for this decision are discussed in the EIS.

Accordingly, the cost impacts resulting from this amendment are those associated with its effect upon the Stage 3 aircraft for which type certification or acoustical change approvals are applied for on or after the applicable dates. As noted by commenters and discussed in the EIS, identified costs of the rule include those in the following three general categories: (1) Investment costs for the development of a new technology airplane which will comply with the new noise levels; (2) changes in the direct operating costs for the new technology airplanes, including costs due to changes in weight, fuel consumption, and performance as a result of design parameters required to meet the reduced noise levels; and (3) lost productivity arising from decreased payload or range capabilities due to design parameters. The FAA has reviewed the nonproprietary cost information and data available to it. In addition, manufacturers of aircraft and aircraft engines were requested to provide the necessary additional data which would be used to consider the economic reasonableness of the proposed rule. The FAA has considered that information and data which was submitted.

The economic bases for a manufacturer's decision of whether the economic/technological factors support the development of a new type of aircraft are treated with the utmost proprietary caution. However, the FAA believes that sufficient data are available to it to determine that the noise limits adopted by this amendment will not eliminate or adversely affect the development or introduction into service of those aircraft which would otherwise be produced. A detailed discussion of the bases for this conclusion is presented in the EIS.

The FAA agrees with those commenters who reasoned that certain aspects of the proposed noise levels would be so

stringent as to make them economically unreasonable and not technologically achievable at this time. The FAA believes, further, that the recent review of aircraft noise levels by ICAO supports this view. While some commenters recommended that the noise limits should be either significantly higher or lower in certain weight and number of engine combinations, the FAA concludes that the noise levels adopted in this amendment reflect the necessary modification of the proposed standard and, within the scope of Notice No. 75–37, are consistent with the purpose and the requirements under section 611 of the Act. The detailed analysis supporting this amendment is contained in the EIS prepared in connection with this action.

As previously indicated, the applicability date for Stage 3 noise levels is based on the date of the application for type certification or acoustical change approval. Several commenters stated that the text of the acoustical change proposal in Notice No. 75–37 was not clear since it would permit Stage 2 or 3 noise levels after a change in type design of a Stage 3 airplane for applications made before November 5, 1975, but for applications made on and after May 5, 1976, Stage 3 noise levels would be required. Several commenters noted the differences in the text of the proposed rule and the preamble discussion. The FAA agrees that the rules should be clarified and simplified by applying the more stringent Stage 3 requirements to applications for acoustical change approvals on and after May 5, 1976, for those airplanes for which Stage 3 noise levels were required for issuance of their type certificates. Accordingly, this amendment adopts the proposal with those clarifications. Since May 5, 1976, was the earliest date proposed on which all applications for acoustical change approvals would be subject to Stage 3 noise levels, this amendment adopts that date.

E. INTERACTION WITH ICAO

Most commenters objected to the FAA's proposed rule because they believed it departed from the work then being carried on by many nations, including the United States, through the International Civil Aviation Organization. Those commenters expressed their concern with unilateral action by the FAA with respect to noise standards for future airplane types which would have significant and far reaching implications for civil aviation on an international scale. Many comments cited the principle that the interests of the orderly growth of international aviation make it necessary for all States to adopt regulations which are in harmony with ICAO standards, rather than those which might result in a proliferation of conflicting standards. Comparisons were frequently made between the proposals in Notice No. 75–37 and the international noise certification standards proposed by the ICAO Committee on Aircraft Noise at the CAN–IV meeting in 1975. Some commenters expressed their disappointment that the FAA would choose not to await the outcome of the ICAO process before proposing noise reduction amendments. Many commenters indicated that they could support adoption of the proposed rule if it were modified to achieve parity with the ICAO recommended standards. Conformity with eventual international noise standards was of primary concern to those commenters.

As stated in Notice No. 75–37 and the Policy Statement, the United States, as a matter of international air transportation policy, encourages agreement on international environmental issues through the ICAO forum. This policy is intended to promote equal treatment for foreign and domestic aircraft manufacturers and operators through international standards and preclude unwarranted economic advantages or disadvantages among competitors which could be created in a world air transportation environment characterized by diverse national noise requirements. In proposing these amendments to Part 36, the FAA stated its belief that, if adopted, the amendments would result in significant improvement in noise levels of newly type certificated airplanes. Further, the FAA stated that the public health and welfare requires that progress be realized by those airplanes that will be using U.S. airports for decades to come. The FAA also believed that the proposals, if adopted on an international basis, would provide a major contribution to the limitation of aircraft noise nuisance at airports throughout the world. The FAA announced its intention to support adoption of the proposed rule by ICAO to achieve the recognized need for conformity. The FAA believed its responsibilities for the development of civil aviation and those under the Noise Control Act of 1972, require that it initiate regulatory proceedings leading to amendment of U.S. airplane noise level limits.

As previously indicated, based on the ICAO recommended airplane noise reduction changes to Annex 16, the FAA proposed alternative noise level and acoustical change requirements in Notice No. 75–37C. Since that notice was published, the recommendations of Working Group D of CAN were adopted at the fifth meeting of the ICAO Committee on Aircraft Noise. Thus, those standards are currently awaiting ratification by ICAO member States. The FAA believes that adoption of the noise standards in this amendment will accomplish most of the objectives of the ICAO standards. Further, supplementary amendments, which would provide additional conformity with the ICAO standards, will be considered for adoption on the basis of Notice No. 75–37C after the close of the comment period for that notice on February 28, 1977.

F. MISCELLANEOUS COMMENTS

A number of comments contained views regarding other aspects of the proposals. Many of those comments involved subjects or issues which are beyond the scope of Notice Nos. 75–37 or 75–37B. To the extent that those comments provided information which is relevant to this regulatory action, those comments have been considered it adopting this amendment.

One commenter suggested, that the FAA should extend its proposed rule to achieve noise reductions in military aircraft. The authority of the FAA to prescribe noise regulations under § 611 of the Act is expressly confined to regulations applicable to civil aircraft and, thus, does not extend to public, including military, aircraft.

Another commenter recommended increasing test reference altitude for the approach noise measuring point, because certain tones, which attenuate at greater distances, are included in the noise level measurement. The 370-foot reference altitude prescribed for approach noise profiles was adopted in Appendix A of Part 36 because it represents a standard approach altitude at the approach measuring point 1 nautical mile from the runway threshold above a 3 degree slide slope. Thus, it is an appropriate test reference to which measured test data may be corrected. Similar comments regarding other aspects of noise test procedure and conditions were also received. Since those comments involve noise test methodology beyond the scope of Notice No. 75–37, they will be considered with respect to the issues involved in Notice No. 76–21 concerning proposed amendments for Appendix A.

Several comments suggested that separate rules should be adopted for turbojet powered airplanes weighing less than 90,000 pounds and another for transport category large airplanes. The rationale presented was that the noise emission characteristics and noise reduction technologies for those airplanes is distinguishable and should be treated separately from the larger turbojet powered airplanes. Comments also stated that since there has been no recent Part 36 certification experience with propeller-driven large transport category airplanes, the available economic and technological data does not exist to support the proposed noise level reduction rule with regard to those airplanes. The FAA agrees that for some regulatory purposes those classes of aircraft could receive separate treatment. However, the FAA does not agree that the rationale offered in the comments compels separate rules or regulatory action for those classes of aircraft. As previously stated, this amendment reflects a full and careful consideration of the noise emission factors that may tend to distinguish the various airplanes affected by it.

Thus, the noise level standards adopted in this amendment apply to transport category propeller-driven large airplanes, as well as to subsonic turbojet powered airplanes, regardless of category. Although the FAA anticipates that most, if not all, of the aircraft that are certificated under the standards adopted in this amendment will be turbojet (including turbofan) powered, the FAA has concluded that the reductions are also appropriate to the affected propeller-

driven large airplanes. Since the late 1940's the government has conducted its own studies, and funded other independent studies, regarding methodology for controlling propeller and engine noise. The FAA believes that the application of that technology would be as appropriate and as cost effective as that required for the turbojet powered airplanes.

Accordingly, this amendment adopts noise standards for those airplanes that are consistent with the purposes and requirements of the Noise Control Act of 1972. There appears no necessity to adopt two or three separate rules when the appropriate distinctions among those airplanes are accounted for. Similarly, the FAA concludes that the available technology allows manufacturers to design and produce airplanes for specific flight purposes and that the new aircraft design selections should include consideration of currently available technology in the design and construction of engine types and sound attenuation devices for those aircraft. Thus, new type designs must preserve already achieved environmentally beneficial aircraft noise reductions. The means of achieving the required noise reduction is, and should be, left to the designers and manufactuers of airplanes. Accordingly, the FAA concludes that based upon its review of the best available noise reduction technology and the cost impacts of requiring its application on all new type designs, this amendment, including the extent to which it applies to turbojet powered airplanes weighing under 75,000 pounds and to transport category airplanes regardless of the type of engine, is consistent with the purposes and requirements of section 611 of the Act.

VI. Effective Date

Since further rulemaking action is contemplated in the near future regarding certain aspects of the amendments being adopted, the FAA has considered whether this amendment should be promulgated before the regulatory procedures on Notice Nos. 75–37C and 76–22 have been completed. As previously indicated, the FAA has concluded that the benefits that can be achieved under this amendment should not be deferred until that later date. The FAA believes that since this amendment prescribes new standards for new type designs and acoustical changes, its early publication should provide aircraft manufacturers and operators a better opportunity to consider these standards in their design and acoustical change planning. However, the FAA recognizes that while such planning is necessary, its regulatory action must be consistent with its responsibilities under section 611 of the Act. Accordingly, the additional proposed rules under consideration involve amendments which, if adopted, may alter, in certain areas, the stringency of those proposed in Notice Nos. 75–37 and 75–37B and now being issued. Those areas include acoustical change requirements for Stage 2 airplanes, reduced takeoff and sideline noise levels limits for certain Stage 3 airplanes, certain noise measuring point distances under § C36.3, and certain takeoff test conditions under § C36.7, as proposed in Notice No. 75–37C, and the recommended amendments, previously discussed, as proposed by the EPA in Notice No. 76–22, as corrected.

The FAA has concluded that it should—(1) announce, as early as possible, the minimum standards for noise reduction that it has already determined should be adopted (based on Notice Nos. 75–37 and 75–37B), (2) provide itself the opportunity to modify, where appropriate, those type certification and acoustical change requirements that are being adopted, (3) avoid the complexity of different requirements for a short period of time due only to staggered effective dates of the amendments, and (4) provide the aviation community the opportunity to accommodate those subsequent amendments into its plans for new type designs or type design changes. To accomplish those objectives, the effective date of this amendment should be delayed until any supplementary amendments have been issued. Since the FAA expects to complete the regulatory process by October 1977, the effective date for this amendment is stated as October 1, 1977.

VII. Regulatory Evaluation

Under the regulatory reform policies of the Secretary of Transportation and the Administrator, comprehensive evaluation of the impacts of this amendment has been completed. In addition to the regulatory impacts previously discussed, the details of that analysis are shown in the Policy Statement and the EIS, particularly chapters 2 and 4. These analyses considered not only the noise reduction benefit, but also the achievement of other significant national objectives, including energy conservation through improved fuel efficiency, improved engine performance for the aircraft mission, improved engine emission levels, and advantages to the consumer of the more advanced aircraft design and lower operating costs despite the effects of modifications to achieve noise reduction.

Based on forecasted aviation growth, the airport noise problem is expected to increase in the future despite the introduction of quieter aircraft. For example, between 1975 and 1990, annual air carrier operations have been forecast to increase from 10 million to 16 million, creating additional noise exposure events that, without Federal action such as this amendment and FAR Amendment 91–136, could more than offset the reduction of noise resulting from an introduction of quieter airplanes. The recent economic trends have brought into question certain aspects of that long established assumption regarding such a substantial growth in airline traffic. Regardless of the recently adopted requirement to retrofit or retire certain turbojet airplanes by 1985 that have not previously been shown to comply with original Part 36 noise standards, it is unclear the extent to which new aircraft types will be introduced in response to the requirements of FAR Amendment 91–136. However, as stated above, it is hoped that this amendment will create strong incentives for the development of a new generation of airplanes markedly quieter than the noise limits in current Part 36. However, the short term noise reduction will remain small in terms of actual community annoyance as long as the aircraft fleets do not include a significant number of Stage 3 airplanes.

As discussed in Section 4.2 of the EIS, the FAA has compared the noise level limits adopted in this amendment with the measured noise levels for aircraft certificated under current Part 36. That comparison revealed that many aircraft using the best currently available technology already meet the Stage 3 levels. The available technology permits manufacturers to trade off noise and emission requirements against weight, fuel, and other direct operating cost factors with minimal net cost differentials. Thus, the effect of this amendment is to preserve already achieved environmental benefits for existing airplane types and provide the standards and incentives for the introduction of newer and quieter types.

The projected cost impact of a new technology aircraft designed to meet Stage 3 noise limits as compared to the same aircraft designed to meet Stage 2 noise limits is estimated to represent an approximate increase of 0.1 percent in direct operating costs and a 0.4 percent reduction on return of investment. On a per airplane basis those costs would amount to approximately $330,000 for the largest aircraft and proportionately less for lighter, smaller aircraft. The FAA estimates the aggregate cost during the first seven years under this amendment would be less than $63 million. The actual projected costs and offsetting economic benefits analysed in the EIS demonstrate the economic impacts of this amendment. Those impacts have been evaluated in accordance with OMB Circular A–107 and DOT Order 2050.4. It was determined that this amendment would not significantly increase costs to the private sector, to consumers, or to Federal, State, or local governments. Accordingly, the FAA has concluded that the cumulative impact of this amendment is not inflationary in nature.

Authority: Secs. 313(a), 601, 603, and 611 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, and 1431); section 6(c) of the Department of Transportation Act (49 U.S.C. 1655(c)); title I of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.); and Executive Order 11514, March 5, 1970.

In consideration of the foregoing, Part 36 of the Federal Aviation Regulations (14 CFR Part 36) is amended effective October 1, 1977, as follows:

§ 36.1 [Amended]

1. Section 36.1 is amended as follows:

a. By amending paragraph (c) after the words "the airplane complies with" by substituting the words "the applicable provisions of § 36.7 or § 36.9 of this part" for the words "§ 36.7 of this Part."

b. By amending the section heading and adding a new paragraph (f) to read as follows:

§ 36.1 Applicability and definitions.

* * * * *

(f) For the purpose of showing compliance with this part for transport category large airplanes and turbojet powered airplanes regardless of category, the following terms have the following meanings:

(1) A "Stage 1 noise level" means a takeoff, sideline, or approach noise level greater than the Stage 2 noise limits prescribed in § C36.5(a)(2) of Appendix C of this part.

(2) A "Stage 1 airplane" means an airplane that has not been shown under this part to comply with the takeoff, sideline, and approach noise levels required for Stage 2 or Stage 3 airplanes.

(3) A "Stage 2 noise level" means a noise level at or below the Stage 2 noise limits prescribed in § C36.5(a)(2) of Appendix C of this part but higher than the Stage 3 noise limits prescribed in § C36.5(a)(3) of Appendix C of this part.

(4) A "Stage 2 airplane" means an airplane that has been shown under this part to comply with Stage 2 noise levels prescribed in § C36.5 of Appendix C of this part (including use of the applicable tradeoff provisions) and that does not comply with the requirements for a Stage 3 airplane.

(5) A "Stage 3 noise level" means a noise level at or below the Stage 3 noise limits prescribed in § C36.5(a)(3) of Appendix C of this part.

(6) A "Stage 3 airplane" means an airplane that has been shown under this part to comply with Stage 3 noise levels prescribed in § C36.5 of Appendix C of this part (including use of the applicable tradeoff provisions).

2. Section 36.7 is revised to read as follows:

§ 36.7 Acoustical change: Subsonic transport category large airplanes and subsonic turbojet powered airplanes.

(a) *Applicability.* This section applies to all subsonic transport category large airplanes and subsonic turbojet powered airplanes for which an acoustical change approval is applied for under § 21.93(b) of this chapter.

(b) *General requirements.* Except as otherwise specifically provided, for each airplane covered by this section, the acoustical change approval requirements are as follows:

(1) In showing compliance, noise levels must be measured and evaluated in accordance with the applicable procedures and conditions prescribed in Appendices A and B of this part.

(2) Compliance with the noise limits prescribed in § C36.5 of Appendix C must be shown in accordance with the applicable provisions of §§ C36.7 and C36.9 of Appendix C of this part.

(c) *Stage 1 airplanes.* For each Stage 1 airplane prior to the change in type design, in addition to the provisions of paragraph (b) of this section, the following apply:

(1) If an airplane is a Stage 1 airplane prior to the change in type design, it may not, after the change in type design, exceed the noise levels created prior to the change in type design. The tradeoff provisions of § C36.5(b) of Appendix C of this part may not be used to increase the Stage 1 noise levels.

(2) In addition, for an airplane for which application is made after September 17, 1971—

(i) There may be no reduction in power or thrust below the highest airworthiness approved power or thrust, during the tests conducted before and after the change in type design; and

(ii) During the takeoff and sideline noise tests conducted before the change in type design, the quietest airworthiness approved configuration available for the highest approved takeoff weight must be used.

(d) *Stage 2 airplaines.* If an airplane is a Stage 2 airplane prior to the change in type design, in addition to the provisions of paragraph (b) of this section, the following apply:

(1) *Applications before November 5, 1975.* For an airplane for which an application for acoustical change approval is made before November 5, 1975, the airplane may not be a Stage 1 airplane after the change in type design.

(2) *Applications on or after November 5, 1975.* For an airplane for which an application for acoustical change approval is made on or after November 5, 1975—

(i) The airplane may not be a Stage 1 airplane after the change in type design; and

(ii) During the takeoff and sideline noise tests conducted before the change in type design, the quietest airworthiness approved configuration available for the highest approved takeoff weight must be used.

(e) *Stage 3 airplanes.* If an airplane is a Stage 3 airplane prior to the change in type design, in addition to the provisions of paragraph (b) of this section, the following apply:

(1) *Applications before May 5, 1976.* For an airplane for which an application for acoustical change approval is made before May 5, 1976, the airplane may not be a Stage 1 airplane after the change in the type design.

(2) *Applications on or after May 5, 1976.* For an airplane for which an application for acoustical change approval is made on or after May 5, 1976, the following apply:

(i) If compliance with Stage 3 noise levels is not required before the change in type design, the airplane must—

(A) Be a Stage 2 airplane after the change in type design and compliance must be shown under the provisions of paragraph (d)(2) of this section; or

(B) Remain a Stage 3 airplane after the change in type design and compliance must be shown under the provisions of paragraph (e)(2)(ii) of this section.

(ii) If compliance with Stage 3 noise levels is required before the change in type design, the airplane must be a Stage 3 airplane after the change in type design.

3. The provisions of paragraph (b) of § 36.7 are redesignated as a new § 36.9 entitled "§ 36.9 *Acoustical change: Propeller-driven small airplanes.*" and paragraphs (b)(1), (b)(2), and (b)(3) are redesignated as paragraphs (a), (b), and (c) respectively.

4. Paragraphs (b) and (c) of § 36.201 are revised to read as follows:

§ 36.201 Noise limits.

* * * * *

(b) *Airplanes with high bypass ratio engines.* For airplanes that have turbojet engines with bypass ratios of 2 or more, the noise limit requirements are as follows:

(1) *Applications before January 1, 1967.* If application is made before January 1, 1967, it must be shown that the noise levels of the airplane are no greater than the Stage 2 noise limits prescribed in § C36.5(a)(2) of Appendix C of this part, or are reduced to the lowest levels that are economically reasonable, technologically practicable, and appropriate to the particular type design.

(2) *Applications on or after January 1, 1967, and before November 5, 1975.* If application is made on or after January 1, 1967, and before November 5, 1975, it must be shown that the noise levels of the airplane are no greater than the Stage 2 noise limits prescribed in § C36.5(a)(2) of Appendix C of this part.

(3) *Applications on or after November 5, 1975.* If application is made on or after November 5, 1975, it must be shown that the noise levels of the airplanes are no greater than the Stage 3 noise limits prescribed in § C36.5(a)(3) of Appendix C of this part.

(c) *Airplanes with low bypass ratio engines.* For airplanes that have turbojet engines with bypass ratios of less than 2 (including no bypass ratio), the noise limit requirements are as follows:

(1) *Applications before December 1, 1969.* If application is made before December 1, 1969, it must be shown that the lowest noise levels, reasonably obtainable through the use of procedures and information developed for the flight crew under § 36.1501, are determined:

(2) *Applications on or after December 1, 1969, and before November 5, 1975.* If application is made on or after December 1, 1969, and before November 5, 1975, it must be shown that the noise levels of the airplane are no greater than the Stage 2 noise limits prescribed in § C36.5(a)(2) of Appendix C of this part.

(3) *Applications after November 5, 1975.* If application is made on or after November 5, 1975, it must be shown that the noise levels of the airplane are no greater than the Stage 3 noise limits prescribed in § C36.5(a)(3) of Appendix C of this part.

* * * * *

5. Appendix C of Part 36 is amended as follows:

(a) Paragraph (c) of § C36.3 is revised to read as follows:

Sec. C36.3 *Noise measuring points.*

* * * * *

(c) For the sideline, at the point, on a line parallel to and 0.25 nautical miles from the extended centerline of the runway, where the noise level after liftoff is greatest, except that, for an airplane powered by more

than three turbojet engines this distance must be 0.35 nautical miles for the purpose of showing compliance with Stage 1 or Stage 2 noise limits (as applicable).

(b) Paragraphs (a) and (b) § C36.5 are revised to read as follows:

Sec. C36.5 *Noise levels.*

(a) *Limits.* Except as provided in paragraphs (b) and (c) of this section, it must be shown by flight test that the noise levels of the airplane, at the measuring points described in § C36.3, do not exceed the following (with appropriate interpolation between weights):

(1) Stage 1 noise limits for acoustical changes for airplanes regardless of the number of engines are those noise levels prescribed under § 36.7(c) of this part.

(2) Stage 2 noise limits for airplanes regardless of the number of engines are as follows:

(i) *For takeoff.*—108 EPNdB for maximum weights of 600,000 pounds or more, reduced by 5 EPNdB per halving of the 600,000 pounds maximum weight down to 93 EPNdB for maximum weights of 75,000 pounds and less.

(ii) *For sideline and approach.*—108 EPNdB for maximum weights of 600,000 pounds or more, reduced by 2 EPNdB per halving of the 600,000 pounds maximum weight down to 102 EPNdB for maximum weights of 75,000 pounds and less.

(3) Stage 3 noise limits are as follows:

(i) *For airplanes with more than 3 engines*—

(A) *For takeoff.*—106 EPNdB for maximum weights of 850,000 pounds or more, reduced by 4 EPNdB per halving of the 850,000 pounds maximum weight down to 90 EPNdB for maximum weights of 53,125 pounds or less;

(B) *For sideline.*—103 EPNdB for maximum weights of 850,000 pounds or more, reduced by 2 EPNdB per halving of the 850,000 pounds maximum weight down to 96 EPNdB for maximum weights of 75,130 pounds and less; and

(C) *For approach.*—105 EPNdB for maximum weights of 850,000 pounds or more, reduced by 2 EPNdB per halving of the 850,000 pounds weight down to 98 EPNdB for maximum weights of 75,130 pounds and less.

(ii) *For airplanes with 3 engines*—

(A) *For takeoff.*—104 EPNdB for maximum weights of 850,000 pounds or more, reduced by 4 EPNdB per halving of the 850,000 pounds maximum weight down to 90 EPNdB for maximum weights of 75,130 pounds and less;

(B) *For sideline.*—103 EPNdB for maximum weights of 882,000 pounds or more, reduced by 2.56 EPNdB per halving of the 882,000 pounds maximum weight down to 96 EPNdB for maximum weights of 132,536 pounds and less; and

(C) *For approach.*—105 EPNdB for maximum weights of 850,000 pounds or more, reduced by 2 EPNdB per halving of the 850,000 pounds weight down to 98 EPNdB for maximum weights of 75,130 pounds and less.

(iii) *For airplanes with fewer than 3 engines*—

(A) *For takeoff.*—101 EPNdB for maximum weights of 850,000 pounds or more, reduced by 4 EPNdB per halving of the 850,000 pounds maximum weight down to 89 EPNdB for maximum weights of 106,250 pounds and less;

(B) *For sideline.*—103 EPNdB for maximum weights of 882,000 pounds or more, reduced by 2.56 EPNdB per halving of the 882,000 pounds maximum weight down to 94 EPNdB for maximum weights of 77,120 pounds and less; and

(C) *For approach.*—105 EPNdB for maximum weights of 850,000 pounds or more, reduced by 2 EPNdB per halving of the 850,000 pounds weight down to 98 EPNdB for maximum weights of 75,130 pounds and less.

(b) *Tradeoffs.* Except to the extent limited under § 36.7(c)(1) of this part, the noise level limits prescribed in paragraph (a) of this section may be exceeded at one or two of the measuring points specified in § C36.3 of this appendix, if—

* * * * *

c. Paragraph (a) of § C36.7 is amended to read as follows:

Sec. C36.7 *Takeoff test conditions.*

(a) This section applies to all takeoff noise tests conducted under this appendix in showing compliance with this part.

* * * * *

NOTE.—The Federal Aviation Administration has determined that this document does not require preparation of an inflationary impact statement under Executive Order 11821 and OMB Circular A-107.

Issued in Washington, D.C., on February 25, 1977.

JOHN L. MCLUCAS,
Administrator.

[FR Doc.77-6308 Filed 3-2-77;8:45 am]